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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 85/TY00M11/WO		FOR FURTHER ACTION		See Form PCT/PEA416
International application No. PCT/B2004/002385		International filing date (day/month/year) 26.07.2004	Priority date (day/month/year) 29.07.2003	
International Patent Classification (IPC) or national classification and IPC G01R31/36				
Applicant TOYOTA JIDOSHA KABUSHIKI KAISHA et al.				
<p>1. This report is the International preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 11 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the International application</p>				
Date of submission of the demand 21.03.2005		Date of completion of this report 31.10.2005		
Name and mailing address of the International preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer Mapp, G Telephone No. +49 89 2399-6057		



INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/IB2004/002385

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-3, 5-14	as originally filed
4, 4a, 4b	received on 21.03.2005 with letter of 18.03.2005

Claims, Numbers

1-18	filed with telefax on 13.10.2005
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Drawings, Sheets

1/7-7/7	as originally filed
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- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/IB2004/002385

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-18
	No: Claims	None
Inventive step (IS)	Yes: Claims	1-18
	No: Claims	None
Industrial applicability (IA)	Yes: Claims	1-18
	No: Claims	None

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V

1. Cited Document

Reference is made to the following document:

**D1: EP-A-0 909 001 (TOYOTA MOTOR CO LTD ; DENSO CORP (JP);
MATSUSHITA ELECTRIC IND CO LTD) 14 April 1999 (1999-04-14)**

2. Subject Matter of Claims 1, 9 and 17

These independent claims disclose a system and method for the control of charging and discharging a battery pack that could be typically found in a hybrid vehicle. Batteries in such packs typically contain strings of cells in series. In a given series of batteries one cell may have a higher or lower state of charge (SOC) than another. This situation leads to a spread of values of state of charge between the various cells.

When the cells are new this spread of SOC's is quite narrow as all the cells are in substantially the same condition, however as the cells age the spread increases.

The problem with this is that when the spread gets too large, a charging system may not detect the fact that the cells are fully charged as the average charge of the cells may be below the fully charged threshold.

3. Closest Prior Art

The closest prior art discloses a system in which the spread of values is accounted for by an iterative system that measures the SOC of each cell and adjusts the threshold for fully charged and discharged accordingly. The problem with this is that the range of movement from fully charged to discharged is continually reduced.

4. Difference between prior art and claims 1, 9 and 17

The present invention seeks to overcome the increase in the spread of SOC values in a series of cell by adopting a preset SOC when the spread of SOC values exceeds a guard value.

5. Technical effect, novelty and inventive step.

The effect of this is to allow accurate determination of SOC and thus to prevent failure discharge and full charge thus allowing the vehicle to make use of the battery and function correctly despite the spread of values of SOC within the pack.

No hint of this particular solution is given in any of the prior art, thus the claims are rendered novel and inventive.